

**Syllabus 1036**  
**Science: Chemistry**  
**Paper 4H**

**MARK SCHEME - Summer 2000**

1. (a) (i) sulphur dioxide/SO<sub>2</sub>;  
oxygen/O<sub>2</sub>; 2
- (ii) sulphur trioxide/SO<sub>3</sub>; 1
- (iii) vanadium ((v)) oxide/V<sub>2</sub>O<sub>5</sub>; 1
- (b) An explanation to include three from:  
1. improve plant growth/yield;  
2. by providing NPK/nutrients/for proteins; max 1 or 2
3. encourage plant/algal growth/choke river;  
4. use up oxygen/kills fish/eq;  
5. eutrophication;  
6. unsuitable for drinking water; max 2 or 1

**Total 7 marks**

2. (a) (i) calcium carbonate/CaCO<sub>3</sub>; 1
- (ii) calcium hydroxide/Ca(OH)<sub>2</sub>; 1
- (iii) aq 1
- (iv) calcium carbonate/CaCO<sub>3</sub>; 1
- (v) water/H<sub>2</sub>O; 1
- (vi) heat;  
[Reject burning] 1
- (vii) step 2; 1
- (b) (i) flame test (name or description, more than "heat");  
red; 2

- (ii) A description to include:
- Either** 1. add (hydrochloric) acid;  
[Reject sulphuric acid]  
2. fizzes/carbon dioxide evolved/  
test for carbon dioxide;
- or** 1. heat;  
2. test for carbon dioxide;
- or** 1. add water with indicator/pH test;  
2. calcium hydroxide result;

2

**Total 11 marks**

3. (a) (i) calcium sulphate; 1
- (ii) calcium hydrogencarbonate;  
magnesium sulphate;  
[Accept calcium sulphate if not given in part (a)(i)] 2
- (b) (i) D/boiling the water; 1
- (ii) C/adding sodium carbonate; 1
- (c) (i) scum/Ca/Mg **ions** only/"CaSt"; 1
- (ii) lather/eq;  
[Ignore no scum/clear]  
[Reject bubbles]  
soft/contains no salts/pure; 2
- (d) (i) calcium carbonate + water + carbon dioxide  $\longrightarrow$  calcium hydrogencarbonate;  
[Accept correct formulae]  
[Ignore balancing] 1
- (ii) photosynthesis;  
sun/light/chlorophyll; 2
- (e) greenhouse effect/global warning; 1

**Total 12 marks**

4. (a) (i) to neutralise **all** the acid; 1
- (ii) zinc oxide/hydroxide; 1

(b) (i)  $\text{Ag}^+(\text{aq}) + \text{Cl}^-(\text{aq}) \longrightarrow \text{AgCl}(\text{s})$ ; 2  
formulae;  
state symbols;

(ii) An explanation to include:  
1. silver chloride insoluble;  
2. no reaction/silver carbonate insoluble in acid; 2

**Total 6 marks**

5. (a) coke/carbon/carbon monoxide; 1  
[Reject coal]

(b) Any five from:  
1. limestone/calcium carbonate;  
2. decomposes/forms calcium oxide (on heating);  
3.  $\text{CaCO}_3 \longrightarrow \text{CaO} + \text{CO}_2$ ;  
[Accept word equation]  
4. calcium oxide reacts with silicon dioxide;  
5.  $\text{CaO} + \text{SiO}_2 \longrightarrow \text{CaSiO}_3$ ;  
[Accept word equation]  
6. forming slag/calcium silicate; 5

**Total 6 marks**

6. (a) suitable scale;  
points plotted;  
smooth curve extrapolated to 50 °C;  
their graph read correctly; 4

(b) (i) heat; 1

(ii) upward delivery of gas/gas syringe;  
[Reject if with water/if sealed] 1

(c)  $\text{NH}_3 = 17$ ;  
amount =  $\frac{53}{17} = 3.12$  (moles);  
concentration = 31.2 (mol dm<sup>-3</sup>); 3

(d) moles  $\text{NH}_3 = \frac{90}{17} = 5.29$ ;  
volume =  $5.29 \times 22.4 = 118.6$  dm<sup>3</sup>;  
[Allow 127 dm<sup>3</sup>/118.6 cm<sup>3</sup> for 1 mark **only**] 2

**Total 11 marks**

7. (a) burette;  
pipette; 2
- (b) **Either** indicator/appropriate named indicator solution;  
correct colour for named indicator;  
eg phenolphthalein - colourless  
methyl orange - orange/red  
screened methyl orange - mauve/grey
- or** pH meter;  
pH = 7/sharp change; 2
- (c) KOH = 56 and KCl = 74.5;  
KOH:KCl in 1:1 mole ratio;  
mass KCl =  $\frac{11.2}{56} \times 74.5 = 14.9(\text{g})$ ; 3

**Total 7 marks**

**TOTAL MARKS 60**